A New Species of *Thalassonerita*? (Gastropoda: Neritidae?) from a Middle Eocene Cold-Seep Carbonate in the Humptulips Formation, Western Washington

by
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Introduction

A few specimens of *Thalassonerita*? ***eocenica***, sp. nov., possibly a neritid gastropod, are present in a localized cold-seep limestone of middle Eocene age in the Humptulips Formation, Grays Harbor County, western Washington. The specimens were found at California State University, Northridge (CSUN) locality 1583, latitude 47°15′10″N, longitude 123°49′W, at an elevation of 83 m (275 ft.), in a small limestone deposit approximately 1 m thick, exposed on the east side of East Fork of Humptulips River, approximately 600 m south and 110 m west of the northeast corner of section 5, T. 20 N, R. 9 W, Burnt Hill quadrangle, 7.5-minute, 1990 provisional edition, Grays Harbor County, Washington. Goedert & Kaler (1996) studied this limestone and interpreted it to be a cold-seep deposit (Figure 1). Although they reported neritiform gastropods from this deposit, they did not describe or name them. Their neritiform gastopods are the same as the new species described in this paper. They also reported the following mollusks from this locality: the gastropod *Abyssochrysos raui* Goedert & Kaler (1996) and the bivalves *Vesicomya* sp. and an unidentified possible lucinid. Saul et al. (in press) recognized two species of this possible lucinid, which they assigned to *Cryptolucina* Saul et al. (in press). They also reported that, based on benthic foraminiferal data, the rocks at CSUN loc. 1583 are middle Eocene in age and were deposited at 1500 to 2000 m depth.

Nearly all ancient and modern species of neritids live in shallow subtidal or intertidal marine habitats or in brackish or freshwather habitats (Clarke, 1989). In 1989, however, a deep-sea neritid, *Bathynerita naticoidea* Clarke, 1989, was discovered living at archibenthal oil and gas seeps on the Louisiana slope in the Gulf of Mexico. This small gastropod was found at depths of 541 and 722 m and was videotaped crawling on live mytilid bivalves, which thrive at these cold-seep sites. Other associated mollusks include vesicomyid and lucinid bivalves. Warén & Bouchet (1993) studied the soft-part anatomy of *B. naticoidea.*

In 1966, a few specimens of a gastropod belonging to subgenus *Thalassonerita* Moroni, 1966, were found in some small isolated outcrops of limestone from the upper Miocene (Tortonian Stage) near the town of Forlì south of Bologna, in the northern Apennines, north-central Italy. Moroni (1966), who assigned these gastropods to family Neritidae, reported that the gastropod-bearing marly limestones contain a low-diversity molluscan assemblage. The fossil fauna is dominated by lucinids and articulated vesicomyids, as well as by modiolid bivalves (Taviani, 1994). Based on faunal composition and on carbon and oxygen isotope studies, Taviani (1994) interpreted these limestones to be authigenic and to have formed in association with venting of methane-rich cold seep fluids on the Miocene sea floor.

Olsson (1931:23) mentioned the presence of *Nerita?* in isolated cherty limestones of middle Eocene? or Oligocene? age in the lower Lomitos cherts, northwestern Peru. The isolated limestones contain abundant specimens of thyasirids associated with lucinids, vesicomyids, and solemyids. Goedert et al. (1995) and Squires & Gring (1996) tentatively reported that these cherty limestones are probably cold-seep deposits. Unfortunately, Olsson did not illustrate these specimens of *Nerita*?, nor did he assign any of them catalog numbers for future study.

The new species from the Humptulips Formation in Washington might belong to family Neritidae, and, if so, it would be the earliest record of neritids that lived around cold-seeps and the first record of a cold-seep neritid from the fossil record of North America.

Systematic Paleontology

Family NERITIDAE? Rafinesque, 1815

Discussion: As will be mentioned below, the new species closely resembles cold-seep gastropods that have been reported to be neritids. In order to confirm the systematic position of this new species, it will be necessary to check for the absence of internal whorl partitions on the earlier whorls, which are known (Keen, 1971) to be resorbed in, at least, shallow-marine neritids. Unfortunately, the poor preservation of the available specimens of the new species does not allow study of the earlier whorls. Until better specimens are found, we judge that the neritid assignment should be tentative.

Genus *Thalassonerita* Moroni, 1966

Discussion: *Thalassonerita* was originally considered to be a subgenus-level taxon (Moroni, 1966). Warén & Bouchet (1993) elevated subgenus *Thalassonerita* to a genus. Taviani (1994) mentioned that, based on unpublished data, he considers *Thalassonerita* to be a senior synonym of the Recent cold-seep taxon *Bathynerita.*

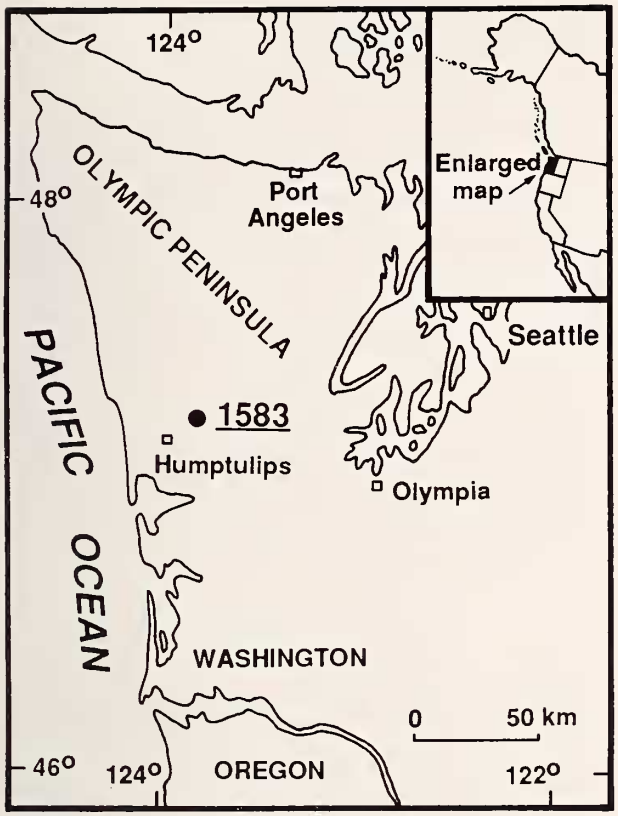


Figure 1

Index map to CSUN loc. 1583, Humptulips Formation, Grays Harbor County, Washington.

Type species: *Neritina* (*Thalassonerita*) *megastoma* Moroni, 1966, upper Miocene, near Forlii, north-central Italy. Moroni (1966) was inconsistent as to the generic placement of this species, and she variously referred to it either as *Neritina* (*T.*) *megastoma* or *Nerita* (*T.*) *megastoma*.

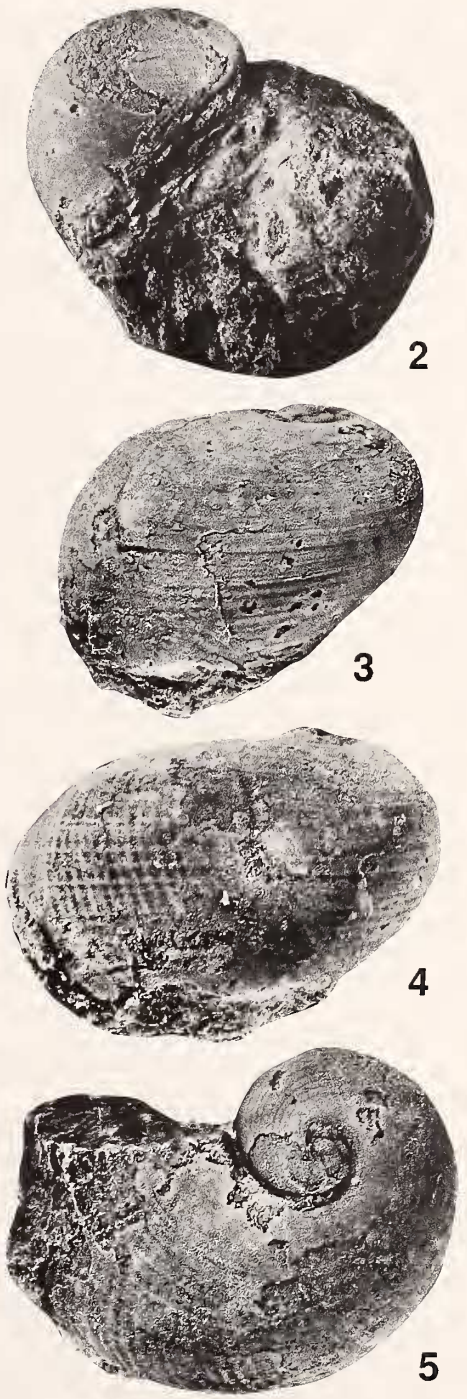
Thalassonerita? ***eocenica*** Squires & Goedert, sp. nov.

(Figures 2–5)

Neritiform gastropod Goedert & Kaler, 1996: 67, table 1.

Diagnosis: Small, neritiform, spire very low, body whorl with weak spiral threads grading into cancellate ornamentation, inner lip apparently smooth with no callus or deck area.

Description: Shell small, up to 6 mm height and 10 mm width; neritiform with very low spire, shell thin; protoconch missing; teleoconch 1½ whorls; suture between spire and body whorl impressed; body whorl rounded, juvenile specimens (about 3 mm height or less) with many weak spiral threads grading, on adult specimens, into slightly stronger cancellate ornamentation; periostracum very thin and with prosocline growth lines; aperture moderately large;



Explanations of Figures 2 to 5

Figures 2–5. *Thalassonerita*? ***eocenica*** Squires & Goedert, sp. nov., holotype LACMIP 11426, CSUN loc. 1583, height 5.8 mm, width 8.5 mm, ×6.6. Figure 2: apertural view. Figure 3: left-lateral view. Figure 4: abapertural view. Figure 5: dorsal view.

inner lip margin sharp with no evidence of teeth and no callus or deck area; outer lip not preserved.

Holotype: Natural History Museum of Los Angeles County, Invertebrate Paleontology Section (LACMIP) 11426.

Type locality: CSUN loc. 1583, latitude 47°15′10″N, longitude 123°49′W.

Paratype: LACMIP 11427, CSUN loc. 1583.

Discussion: Fourteen specimens of the new species were found at CSUN loc. 1583. All show some degree of weathering. Five of the 14 specimens are whole and have shell material, but the shell material is nearly completely gone with only a very thin remnant left. These specimens are nearly internal molds. In addition, the shell is missing on the spires of all these specimens. Five other specimens are internal molds, and four other specimens are fragments. The specimens range in height from 1 to 6 mm. Cleaning of the specimens is difficult because they are embedded in hard limestone. Only remnants of the periostracum are preserved, and they are usually only on juvenile specimens.

The new species most resembles *Thalassonerita megastoma* (Moroni, 1966:70–72, pl. 1, figs. 1–7) from the upper Miocene "Calcari a Lucine" near Forlì, north-central Italy. Moroni (1966) and Warén & Bouchet (1993) reported this species to be a neritid. The new species differs from *T. megastoma* in the following features: no callused flattened deck area along the inner lip, spiral threads on the entire body whorl rather than just on the initial (juvenile) portion, and the presence of cancellate ornamentation on the adult portion of the body whorl near the outer lip.

The new species resembles *Bathynerita naticoidea* Clarke (1989:125–129, pl. 2, figs. 3, 4, text figs.) from modern oil and gas seeps on the Louisiana slope in the Gulf of Mexico. Clarke (1989) reported this species to be a neritid as did Warén & Bouchet (1993:3–7, figs. 1, 2, 3a–c), who also illustrated and discussed it. The new species differs from *B. naticoidea* in the following features: no callused flattened deck area along the inner lip, and presence of spiral threads and cancellate ornamentation rather than being smooth.

Although both *Thalassonerita megastoma* and *Bathynerita naticoidea* have a callused flattened deck area like that found in many neritids, no information is available as to whether or not the internal whorl partitions of the earlier whorls have been resorbed. The systematic assignment of both of these species to family Neritidae would be strengthened if it could be shown that these internal whorl partitions are absent.

The lack of a callused deck area on the new species would seem to indicate assignment to a new genus that is otherwise closely related to *Thalassonerita* and *Bathynerita*. The inner lip callus of neritids, however, is especially prone to post-mortem dissolution (Squires & Saul, 1993), and cold-seep sites are commonly associated with selective dissolution of molluscan carbonate shell material (Squires & Gring, 1996). Until it can be determined whether or not the new species can have a callused deck area, we judge that the generic assignment remain tentative.

Warén & Bouchet (1993) reported that although it is difficult to conclude anything about the age of the lineage represented by neritids that live in the deep sea around cold seeps, it is probable that they evolved independently of other neritids since before the Tertiary. If the deep-sea, cold-seep gastropod *Thalassonerita*? ***eocenica*** sp. nov. does eventually prove to be a neritid, it would significantly extend the fossil record of this lineage and would thereby strengthen the hypothesis of Warén & Bouchet (1993).

Acknowledgments

Keith L. Kaler (Olympia, Washington) and Gail H. Goedert helped collect the fossils. Lindsey T. Groves (Natural History Museum of Los Angeles County, Malacology Section) helped in obtaining literature.

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